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JENKINS, WILSON, TAYLOR & HUNT, P. A.			EXAMINER	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/538,470	Applicant(s) IWAMURA, EIJI
	Examiner DANIEL C. MCCRACKEN	Art Unit 1736

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) Responsive to communication(s) filed on 29 November 2010.
- 2a) This action is FINAL. 2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) Claim(s) 1,2,5-8 and 10-13 is/are pending in the application.
 - 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) Claim(s) _____ is/are allowed.
- 6) Claim(s) 1,2,5-8,10,11 and 13 is/are rejected.
- 7) Claim(s) 12 is/are objected to.
- 8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on _____ is/are: a) accepted or b) objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) All b) Some * c) None of:
 1. Certified copies of the priority documents have been received.
 2. Certified copies of the priority documents have been received in Application No. _____.
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) Notice of References Cited (PTO-892)
- 2) Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) Information Disclosure Statement(s) (PTO/SB/08)
 Paper No./Mail Date _____
- 4) Interview Summary (PTO-413)
 Paper No./Mail Date _____
- 5) Notice of Informal Patent Application
- 6) Other: _____

DETAILED ACTION

Citation to the Specification will be in the following format: (S. # : ¶/L) where # denotes the page number and ¶/L denotes the paragraph number or line number. Citation to patent literature will be in the form (Inventor # : LL) where # is the column number and LL is the line number. Citation to the pre-grant publication literature will be in the following format (Inventor # : ¶) where # denotes the page number and ¶ denotes the paragraph number.

Status of Application

The response dated 11/29/2010 has been received and will be entered. Claims 1-2, 5-8 and 10-13 are pending. Claims 1-2 and 5-6 are currently amended. Claims 12-13 are new. Claims 3-4 and 9 are acknowledged as cancelled.

Information Disclosure Statement

The information disclosure statement (IDS) submitted on 11/29/2010 was filed after the mailing date of the Non-final Office Action on 5/28/2010. The submission is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

Response to Arguments

Claim Rejections – 35 U.S.C. §103

I. With respect to the rejection of Claims 2, 7-8 and 10 under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over US Statutory

Invention Registration H1,924 to Zabinski, et al., the traversal is on the grounds that “Zabinski appears to describe a composite comprising a nanocrystalline metal carbide, such as a TiC.” (Remarks of 11/29/2010 at 5). Applicants “believe[] that the term ‘metal element’ [in Claim 2] refers to a metal in a form that easily combines with hydrogen to form a metallic hydride or interstitial hydride.” (Remarks of 11/29/2010 at 4). These “beliefs” have been considered, but are not persuasive. No attribution or citation to the Specification was provided to indicate that the term “metal element” has been given any special definition to control its meaning. The Specification has been reviewed. While roughly the same language as argued was provided at e.g. (S. 2: 12-13; 4: 14-17), this language does not rise to the level of “clearly setting forth a definition of the term that is different from its ordinary and customary meaning(s).” MPEP 2111.01 IV. The language in the Specification calls for speculation, i.e. “beliefs” about what something does. It does not clearly delineate what something is.

The arguments related to carbides have been considered, but are not persuasive. The remarks state “The metal of claim 2 is **not believed to be** present in a carbide.” So called “beliefs” are irrelevant to the inquiry. The claim clearly requires “at least one metal element selected from the group consisting of Zr, Hf and Y.” The claim scope does not change depending on current or future “beliefs.” The only relevant inquiry insofar as the claim is concerned is whether the metal is present or not. The claim places no restrictions on what form the metal is in, be it elemental, an alloy, a carbide, nitride, etc. To the contrary, the language suggests that other elements can be present by virtue of the “at least one element selected from” language.

The arguments related to the performance or suitability of carbides have been considered, but are not persuasive. See (Remarks of 11/29/2010 at 5) (“Applicants further note that the

instant specification provides experimental evidence of the unsuitability of films comprising carbides for use as hydrogen storage materials. See, e.g., Instant Specification, page 12, lines 16-20, which describes a comparative example (i.e., Comparative Example 4) where a film having Ti present in a carbide form had relatively poor hydrogen occlusion ability.”). The passage called out in the remarks is reproduced below:

In case of comparative example 4 wherein the content of Ti is 35 atomic %, it is shown that not only the initial hydrogen occlusion amount but also the hydrogen occlusion amount after the repeated occlusion / release process is low. In this comparative example 4, **when XRD (X-ray diffraction) was carried out, it was found that the Ti incorporated in the film forms a carbide (TiC).**

(S. 12: 16-20) (emphasis added). It appears that the Specification is describing carbide formation as the result of further processing or analysis, i.e. x-ray diffraction. It is not understood how this is relevant to the pending claims or the rejection. Furthermore, it appears that the remarks are making a “transitional phrase” type argument, i.e. arguing a more “closed” transitional phrase like “consisting essentially of” and then attempting to present evidence to show that the additional material (in this case the carbon of the metal carbide) affects the basic and novel characteristics of the claimed invention (in this case, hydrogen storage). This is not persuasive to the claims as drafted. All that is required of the claims is the listed elements. There are no restrictions on any other elements that can be present. As noted above, the claims suggest that other elements (for example carbon) can be present. The specific remarks directed towards Claim 7 have been considered but are not persuasive. Note the Office Action did not apply an “obviousness of ranges” or overlapping ranges rationale as alleged in the Remarks. (Remarks of 11/29/2010 at 5). Rather the office action called out Table 1 in Zabinski. The values here are

squarely within the claimed range. As such, these remarks were not persuasive, not understood, or both. The rejection is MAINTAINED, updated to address the newly claimed embodiment.

II. With respect to the rejection of Claims 2, 7 and 8 under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over US 2001/0031346 to Iwamura, the remarks appear to rely on the amendments deleting “Ti” from the Markush group. This has been considered and is persuasive. While Iwamura teaches the metals (Iwamura 1: [0013]) this is in the context of referring to prior art. The rejection is WITHDRAWN.

III. With respect to the rejection of Claims 2 and 7-8 under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Bauer, et al., Mechanical properties and performance of magnetron-sputtered graded diamond-like carbon films with and without metal additions, Diamond and Related Materials 2002; 11: 1139-1142 (hereinafter “Bauer at __”), the remarks appear to rely on the amendments deleting “Ti” from the Markush group. This has been considered and is persuasive. The rejection is WITHDRAWN.

IV. With respect to the rejection of Claims 1 and 11 under 35 U.S.C. 103(a) as being unpatentable over US Statutory Invention Registration H1,924 to Zabinski, et al. in view of US 5,753,387 to Takami, et al. to show a state of fact, the traversal is on similar grounds as presented in connection with “Rejection I” supra related to carbides, etc. See generally (Remarks of 11/29/2010 at 8). The remarks presented above apply mutatis mutandis. The claims do not exclude a carbide, or anything else for that matter. This is the definition of “comprising.” MPEP 2111.03.

The remarks related to “columns” have been considered, but again, this feature is not being claimed. Why is this relevant? Note that whatever “thickness direction” is taken to mean, it

is generic to all “directions” in which there is a “thickness.” As such, the claim reads on films with different densities, suggested by Zabinski as discussed in the Office Action. The rejection is MAINTAINED, updated to address the newly claimed embodiment.

V. With respect to the rejection of Claims 1 and 11 under 35 U.S.C. 103(a) as being unpatentable over US 2001/0031346 to Iwamura in view of US 5,753,387 to Takami, et al. to show a state of fact, the remarks appear to rely on the amendments deleting “Ti” from the Markush group. This has been considered and is persuasive. The rejection is WITHDRAWN.

VI. With respect to the rejection of Claim 5 under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over US 4,844,785 to Kitabatake, et al. in view of US 3,480,575 to Coats to show a state of fact, the remarks appear to rely on the amendments deleting “Ti” from the Markush group. This has been considered and is persuasive. The rejection is WITHDRAWN.

VII. With respect to the rejection of Claim 6 under 35 U.S.C. 103(a) as being unpatentable over US 4,844,785 to Kitabatake, et al. in view of Zhang, et al., Residual stress characterization of diamond-like carbon coatings by an X-ray diffraction method, Surface Coatings Technology 1999; 122: 219-224 (hereinafter “Zhang at __”), the remarks appear to rely on the amendments deleting “Ti” from the Markush group. This has been considered and is persuasive. The rejection is WITHDRAWN.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

I. Claims 2 and 13 are rejected under 35 U.S.C. 102(b) as being anticipated by US 5,478,456 to Humpal, et al.

With respect to Claim 2, this claim requires “a film containing voids.” Humpal teaches a film with voids. (Humpal 2: 50-53). Claim 2 further requires that “the film is of an amorphous carbon containing at least one metal element selected from the group consisting of Zr, Hf and Y.” Amorphous carbon is taught. Id. Yttrium is taught. See e.g. (Humpal 2: 40). As to Claim 13, see Id.

Claim Rejections - 35 USC § 103

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

I. Claims 2, 7-8 and 10 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over US Statutory Invention Registration H1,924 to Zabinski, et al.

With respect to Claim 2, this claim requires “a film containing voids.” Zabinski teaches films. See e.g. (Zabinski 5: 17 et seq.). Zabinski does not state in haec verba “a film containing voids.” However, Zabinski arrives at these films by magnetron sputtering. See e.g. (Zabinski 3: 39 et seq.). Applicants state on and for the record in their own Specification that “any physical vapor deposition (PVD) method” can make the material. (S. 7: 22). This can include sputtering. (S. 7: 23). This is the reasoning tending to show inherency. “Where applicant claims a

composition in terms of a function, property or characteristic and the composition of the prior art is the same as that of the claim but the function is not explicitly disclosed by the reference, the examiner may make a rejection under both 35 .S.C. 102 and 103, expressed as a 102/103 rejection.” MPEP 2112 III. “[T]he PTO can require an applicant to prove that the prior art products do not necessarily or inherently possess the characteristics of his [or her] claimed product. Whether the rejection is based on inherency’ under 35 U.S.C. 102, on prima facie obviousness’ under 35 U.S.C. 103, jointly or alternatively, the burden of proof is the same...[footnote omitted].” The burden of proof is similar to that required with respect to product-by-process claims. In re Fitzgerald, 619 F.2d 67, 70, 205 USPQ 594, 596 (CCPA 1980) (quoting In re Best, 562 F.2d 1252, 1255, 195 USPQ 430, 433-34 (CCPA 1977)).

Claim 2 further requires that “the film is of an amorphous carbon containing at least one metal element selected from the group consisting of Zr, Hf and Y.” The metals and the amorphous carbon are taught. See e.g. (Zabinski 3: 25-32) (“The invention was demonstrated by production of nanocrystalline TiC carbides in an amorphous diamond-like carbon (a-DLC) matrix, but is also applicable to other carbides in an a-DLC matrix, including carbides of tungsten, silicon, vanadium, tantalum, **zirconium, hafnium**, chromium, molybdenum, niobium, copper, aluminum and others as would occur to the skilled artisan practicing the invention.”) (emphasis added). Note also the claim is reciting an element selected from [certain metals]. The claim is not reciting elemental metals. As such, application of carbides is proper.

As to Claim 7, note the composition limitations are taught at (Zabinski “Table 1”). While this passage may be related to titanium, note the passage quoted above (Zabinski 3: 25-32) which states that the technique is applicable to other carbides.

As to Claims 8 and 10, given the substantial similarity in processes it is expected that the claimed properties (voids extending to a “thickness direction”) are taught. Given the compositional makeup is taught, it is expected that any hydrogen storage capabilities or properties (to the extent they are to be given patentable weight) are necessarily taught.

II. Claims 1 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Statutory Invention Registration H1,924 to Zabinski, et al. in view of US 5,753,387 to Takami, et al. to show a state of fact.

With respect to Claim 1, this claim requires “a hydrogen storage material in the form of a film comprising a first region composed primarily of an amorphous carbon containing from 0.02 to 30 atomic % of at least one metal element selected from the group consisting of Zr, Hf and Y.” Zabinski teaches an amorphous carbon composite with the claimed metals. See generally (Zabinski 2: 60 et seq) (composites/“amorphous carbon”), (Zabinski 3: 25-32) (metals). The compositions are taught. (Zabinski “Table 1”) and to the extent this passage teaches titanium, Zabinski teaches that the technique is applicable to other metals. (Zabinski 3: 25-32).

Claim 1 further requires “and a second region that extends in a thickness direction of the film composed primarily of an amorphous carbon, the second region having a density from 10 to 40% lower than that of the first region.” As to these density limitations, note the discussion in column 4 of Zabinski that relates density as a function of deposition rate. Optimizing this (which is akin to changing the deposition rate) is well within the skill of the art. See MPEP 2144.05 regarding optimization of result-effective variables.

As to Claim 11, this claim appears to have a density that would read on amorphous carbon, taught by Zabinski. See (Takami 2: 55-60) (“wherein the carbonaceous material has a region of amorphous carbon structure and a region of graphite structure, and the carbonaceous

material has a true density of 1.8 g/cm³") (note Takami is relied on for the density limitation only).

III. Claims 5-6 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over US 2001/0009221 to Anzaki, et al.

With respect to Claim 5, this claim requires "providing a source of carbon containing pieces of at least one metal element selected from the group consisting of Zr, Hf and Y." Anzaki teaches the target/carbon source. Anzaki teaches the following passage:

[0033] According to the invention, the material for the targets may be of a single type, and as target materials there may be used metals and inorganic elements composed mainly of conductive materials such as Al, Si, Ti, Nb, Zn, Sn, **Zr, In, Bi, Ta, V, Cr, Fe, Ni, Ce and C, as well as their alloys and suboxides.** Oxides or nitrides of these target materials can be accumulated onto the substrate 4 in one or more layers by reactive sputtering using oxygen or nitrogen.

[0034] Experimentally, C targets have been used by mixing an organic carbon compound gas such as methane with argon or the like and introducing them for plasma conversion to stably obtain diamond-like carbon films or carbon hydride films at low temperature and with high density and hardness. This has allowed stable coating of dense dielectric materials or protective film materials at a rapid speed.

[0035] Moreover, oxides of the aforementioned metals and inorganic substances composed mainly of Al, Si, Ti, Nb, Zn, Sn, **Zr, In, Bi, Ta, V, Cr, Fe, Ni, Ce and C, or compound oxides or nitrides of a plurality of these metals** may be used as target materials, and targets whose surface resistance is no greater than surface resistance 1 K-ohm can be accumulated on the substrate 4 to one or more layers by sputtering carried out using mainly argon. This method allows dielectric materials to be stably coated from ceramic targets.

(Ansaki 3: [0033]-[0035]) (emphasis added). The passage above is being construed in the conjunctive, i.e. Zr and C. Note that “alloys” are explicitly provided for. Note also that paragraph [0036] provides for “target layers made with two or more different target materials.”

Claim 5 further requires “forming a film composed of an amorphous carbon containing said metal element on the surface of a base material at a temperature of 773 K or less according to a gas phase synthesis.” The temperatures are taught. (Azaki “Table 1”). Note that the specification characterizes “sputtering” as a gas phase process. (S. 7: 21-23). Azaki teaches sputtering. See e.g. (Azaki 1: [0013]). Films are taught. Id. Recitation of a carbon target and the claimed temperatures suggests the amorphous carbon film. This is the reasoning tending to show inherency. “Where applicant claims a composition in terms of a function, property or characteristic and the composition of the prior art is the same as that of the claim but the function is not explicitly disclosed by the reference, the examiner may make a rejection under both 35 .S.C. 102 and 103, expressed as a 102/103 rejection.” MPEP 2112 III. “[T]he PTO can require an applicant to prove that the prior art products do not necessarily or inherently possess the characteristics of his [or her] claimed product. Whether the rejection is based on inherency’ under 35 U.S.C. 102, on prima facie obviousness’ under 35 U.S.C. 103, jointly or alternatively, the burden of proof is the same...[footnote omitted].” The burden of proof is similar to that required with respect to product-by-process claims. In re Fitzgerald, 619 F.2d 67, 70, 205 USPQ 594, 596 (CCPA 1980) (quoting In re Best, 562 F.2d 1252, 1255, 195 USPQ 430, 433-34 (CCPA 1977)).

With respect to Claim 6, this claim requires “providing a source of carbon containing pieces of at least one metal element selected from the group consisting of Zr, Hf and Y.” Anzaki teaches the metal target/carbon source. The discussion accompanying Claim 5 is relied upon.

Claim 6 further requires “forming a film composed of an amorphous carbon containing said metal element on the surface of a base material under a process gas pressure of 1.33322 Pa or more according to a sputtering process.” Films are taught. See e.g. (Anzaki “Table 1”) (Examples). The claim recites an open-ended pressure range, i.e. vacuum or greater. These pressures are taught. (Anasaki 1: [0013]). Sputtering is taught. See e.g. (Anzaki 1: [0013]). Recitation of a carbon target at the claimed pressures suggests the amorphous carbon film is made. This is the reasoning tending to show inherency. “Where applicant claims a composition in terms of a function, property or characteristic and the composition of the prior art is the same as that of the claim but the function is not explicitly disclosed by the reference, the examiner may make a rejection under both 35 .S.C. 102 and 103, expressed as a 102/103 rejection.” MPEP 2112 III. “[T]he PTO can require an applicant to prove that the prior art products do not necessarily or inherently possess the characteristics of his [or her] claimed product. Whether the rejection is based on inherency’ under 35 U.S.C. 102, on prima facie obviousness’ under 35 U.S.C. 103, jointly or alternatively, the burden of proof is the same...[footnote omitted].” The burden of proof is similar to that required with respect to product-by-process claims. In re Fitzgerald, 619 F.2d 67, 70, 205 USPQ 594, 596 (CCPA 1980) (quoting In re Best, 562 F.2d 1252, 1255, 195 USPQ 430, 433-34 (CCPA 1977)).

IV. Claim 5-6 is rejected under 35 U.S.C. 103(a) as being unpatentable over US 2001/0009221 to Anzaki, et al.

The discussion of Anzaki accompanying the 102/103 rejection (“Rejection I.”) supra is expressly incorporated herein by reference. To the extent the “material for the targets may be of a single type” language found at (Anzaki 3: [0033]) can be interpreted as requiring single composition targets, note that both Zr and C are taught. Combining them is an obvious expedient. See MPEP 2144.06 (“It is prima facie obvious to combine two compositions each of which is taught by the prior art to be useful for the same purpose, in order to form a third composition to be used for the very same purpose.... [T]he idea of combining them flows logically from their having been individually taught in the prior art.” In re Kerkhoven, 626 F.2d 846, 850, 205 USPQ 1069, 1072 (CCPA 1980) (citations omitted.”).

Allowable Subject Matter

Claim 12 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The search of the prior art, while suggesting the composition with Zr and Hf (i.e. the Zabisnki reference), did not suggest the composition with Y with the specificity required by the claim.

Conclusion

Applicant's amendment deleting titanium and adding new claims drawn to Y embodiments necessitated the new ground(s) of rejection presented in this Office action.

Art Unit: 1736

Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DANIEL C. MCCRACKEN whose telephone number is (571)272-6537. The examiner can normally be reached on Monday through Friday, 9 AM - 6 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stanley S. Silverman can be reached on (571) 272-1358. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Daniel C. McCracken/
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